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SANITATION IN THE PHILIPPINE ISLANDS.

WORK OF THE SANITARY COMMISSIONS.

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The progress of sanitation in the Philippine Islands may be best considered by classifying it in two periods: First, the period of elimination of the graver epidemic diseases; second, the period of constructive sanitation.

The first period, or that of the elimination of grave epidemic diseases, extended from the beginning of the American occupation to and including the year 1908. During this period the principal efforts of the health authorities were directed toward controlling outbreaks of cholera, systematically vaccinating the inhabitants to get rid of smallpox, and taking measures to eliminate bubonic plague. The results have been satisfactory in that smallpox and plague have been, for all practical purposes, eliminated, and cholera has been so effectively controlled that it can no longer be considered a menace and, it is believed, can never again assume serious epidemic proportions.

The second period, or that of constructive sanitation, began in 1906, when investigations were begun with a view to improving the general water supply of the islands. After careful study of such data as were available, it was determined that the best general solution of the question would be the drilling of artesian wells at such points as might be possible throughout the Archipelago. Investigations that had been made indicated that the percentage of failures would probably be small, that the cost would not be prohibitive, and that the results would be satisfactory. Prior to 1906 there were only 12 water-supply installations which might be considered as satisfactory. The first artesian wells put down during the year 1907 were satisfactory as to flow and potability of water, and their success immediately created a strong desire for artesian wells in all portions of the islands. Since that time the number has

increased until there are now over 1,200 wells furnishing a very satisfactory quality of drinking water. In addition, several gravity systems have been installed and are giving satisfaction.

As early as 1906 it was realized that to supplement the artesian wells some cheap and easily installed type of sewage-disposal system must be developed to handle that phase of the situation. Studies were begun and various ideas were worked out. None, however, seemed to meet the requirements. Numerous attempts have since been made to solve the question by the use of pits, the installation of pail systems, and by various other methods. Generally, however, the results obtained were worse than the original condition, on account of the fact that proper care was not taken and serious nuisances were created.

During 1915 the results that had been obtained by the use of the water of artesian wells and from the use of the various types of sewage disposal that had been tried were reviewed. It was soon learned that, while considerable benefit had resulted, especially from the wells, morbidity and mortality rates were still much too high, and additional information as to causes of morbidity and mortality was imperative. In order to meet the need for accurate information, so that the remedy when developed might correct the condition for which it was evolved, it was decided to form sanitary commissions along the lines and for the purposes indicated below.

The first commission was established and placed in the field in June, 1915, beginning its operations in Pasig, Rizal. It was composed of a physician, an engineer, a bacteriologist, district nurses, and a sanitary inspector. Additional personnel as needed were added from time to time or obtained from the municipality of Pasig.

The commission was instructed to make investigations upon the following points: (1) Prevailing types of disease; (2) factors which contribute to the spread and extension of these diseases; (3) prevalence of intestinal parasites; (4) best methods of improving water supply, sewage and garbage disposal, and as to the possibility of improving housing and living conditions through proper utilization of means and materials locally obtainable; (5) drainage and canalization to obviate fly and mosquito breeding; (6) possibility for bettering building location and arrangement so as to improve lighting, ventilation, building sites, etc.; (7) possible improvements of health organizations with especial reference to personnel, employment of visiting nurses, etc.; (8) possibility of establishing sanitary markets and dairies; (9) investigations into the financial status of the municipality for the purpose of carrying out the recommendations that were to be made by the commission.

The first step of the commission upon arriving at Pasig was to locate itself in rooms provided in the municipal building, to establish

its laboratory, to open a clinic for the gratuitous treatment of the inhabitants, and to take a census of the community.

The census showed that the population of Pasig was 14,752, as compared with a population of 11,278 in 1903, when the official census was taken.

The prevailing diseases causing the greatest morbidity and mortality were found to be as follows:

Among adults—(1) Diseases of the respiratory system, as bronchitis and tuberculosis; (2) diseases of the gastrointestinal system, as acute and chronic enteritis, gastritis and dysentery. Among children the great causes of morbidity and mortality were respiratory and nutritional diseases—under respiratory, rhinitis and bronchitis; and under nutritional, infantile beriberi, marasmus, and diarrheas.

The mortality per thousand inhabitants was, during the year 1914, 36.64, as compared with 82.4 in 1903. The high rate in 1903 was due to the presence of cholera, which did not exist in 1914. Eliminating cholera, therefore, in order to place the two rates upon the same basis, the corrected rate for 1903 was shown to be 68.2 per thousand per annum.

The increase in population was shown to be due almost entirely to immigration, as during the entire period the difference between the birth and death rate averaged only about 1 per cent in favor of the birth rate.

The principal factors which contributed to the spread and extension of diseases were determined to be as follows:

In adults, respiratory diseases were caused by faulty personal hygiene, lack of ventilation, failure properly to dispose of sputum and pulmonary excretions, overcrowding in houses, particularly sleeping quarters, and lowered vitality due to lack of a properly balanced and nutritious diet.

The factors which contributed to the spread and extension of intestinal diseases among adults were almost exclusively a poor water supply and lack of proper sewage disposal.

Poor water supply: Of the total population of 14,752 inhabitants, 26.62 per cent obtained water from satisfactory sources. The handling, however, was faulty and infection occurred either in transit or in the house.

Of the remaining population, 54.5 per cent drank from surface wells and 18.8 per cent used river water. Of 89 surface wells examined the highest bacterial count was 89,600 bacteria per c. c. and the minimum 237 per c. c.; 74.16 per cent contained *Bacillus coli*. The count of river water varied from 14,219 per c. c. to 1,145 per c. c.

Of the soft drinks manufactured and consumed in Pasig 35.49 per cent contained the colon bacillus, 74.19 per cent contained anerobic bacilli, 58.06 per cent contained amebæ, 22.58 per cent contained

ciliates, and 83.87 per cent contained flagellates. The maximum count per c. c. was 96,000 and the minimum 28.

Another factor of importance in the spread of intestinal diseases was the lack of sewage-disposal facilities, with resulting infections by intestinal parasites. Of a total of 3,246 houses in Pasig, only 3.7 per cent, which represented 5.6 per cent of the population, were provided with toilets of a kind which could be considered as meeting the minimum sanitary requirements. The garbage collection was intermittent and unsatisfactory, and no containers for house refuse were used, the garbage being piled in heaps and later collected into wagons which hauled it away and dumped it.

The factors which contributed to the spread of disease among infants were as follows:

With reference to air-borne diseases—Lack of bathing, lack of adequate and clean clothing, slovenliness on the part of the mother in cleaning the baby's nose and mouth with any rag that happened to be convenient and which, as likely as not, had been used by another person, and feeding the baby with food that had been masticated by another person.

The factors which contributed to the spread of intestinal diseases among children were stated to be as follows: (1) Faulty nutrition of the mother due to a lack of a properly balanced and nutritious diet, with consequent low food value of the mother's milk and insufficient quantity; (2) the presence of beriberi in 10 per cent of women in the child-bearing period; (3) improper and irregular feeding of the child; (4) the general use of basabasa, or a sort of broth or soup made from polished rice, to supplement the mother's milk after 6 months of age; (5) the infection of the mother's milk itself and lack of proper milk for artificial feeding.

Examination of Milk.

Sixty-six samples of carabaos' and goats' milk were examined. The maximum bacterial count was 6,720,000 per c. c., and the minimum 450,000. *Bacillus coli* was present in 54.4 per cent of specimens examined, chromogenic staphylococci and streptococci in 17.6 per cent, and *bacillus pyocyaneus* in 4.4 per cent, respectively.

In 11 specimens of mothers' milk examined, all collected with sterile breast pumps after a thorough disinfection of the breast and plated immediately after withdrawal, the bacterial count resulted as follows: 120,000 per c. c. in 2 cases, 70,000 per c. c. in 1 case, 25,000 in 2 cases, 20,000 in 1 case, and 10,000 in 5 cases. The organisms commonly found were of the staphylococcus group with colon occasionally present. Further investigations of this discovery are now being carried on by the Bureau of Science for the purpose of determining how to prevent this condition and to determine its

cause. There can be no doubt that the great prevalence of diarrhea among small children and the frequency of deaths from convulsions and meningitis are due to the presence of these pus-producing organisms in the breast milk of the mother. The theory has been advanced that these organisms are present in the mother's milk due to the low vitality of the mother as a result of faulty nutrition and unhygienic methods of living which bring about an inability to resist the invasion of such organisms and prevent their growth up and into the milk ducts. Blood cultures were made to determine whether a bacteriemia existed which might have produced the condition, but with invariably negative results.

Prevalence of Intestinal Parasites.

Of 1,036 subjects examined, 94.69 per cent were found to harbor intestinal parasites. The parasites found and their percentages were as follows: *Trichiura*, or whipworm, 70 per cent; *ascaris*, or roundworm, 65 per cent; *ankylostoma*, or hookworm, 11 per cent; *oxyurus*, or pinworm, 10.42 per cent; *ameba*, 4.72 per cent. The rest consisted of *strongyloides*, *trichomonas*, *balentidia*, tapeworms, and *fasciolæ*. Thirty-eight and twenty-three-hundredths per cent had single infections, 46.95 per cent had double infections, and the rest had either triple, quadruple, or quintuple infections.

Methods of Improving Water Supplies, Sewage and Garbage Disposal.

Attempts were made to develop sterilization methods which would render existing water supplies fit for human consumption, and while fairly satisfactory methods were worked out with a cost sufficiently low to make them practicable, they are not recommended for general use on account of the fact that more and better care in their application is required than was found to be locally available.

As a result of geological studies made by the sanitary engineer early in 1915, two artesian wells had been drilled in the location selected, with the result that a sufficient amount of potable water is now available which will shortly be conducted into the town and a house service furnished through a local system of distribution to be established by the municipality. It is believed that the question of water supply will thus be satisfactorily solved.

The question of sewage disposal will be met by recommending as a minimum requirement the installation of what has been designated as the Antipolo system of sewage disposal. Briefly, this system consists in the excavation of a pit in the earth, the sides of which are protected with retaining walls to prevent caving; the bottom will be left exposed so that liquids may readily absorb into the surrounding ground; the pit will be covered with stone, concrete, or

boards covered with not less than 20 centimeters of earth. Into this pit will be conducted two pipes—one through which the fecal matter enters and the other to serve for ventilation, being effectually screened against flies and mosquitoes. After defecation the entrance pipe is cleansed by flushing with a bucket of water. A seat with an automatically closing lid is provided to prevent the ingress and egress of insects. Waste water from the kitchen and back porch (*batalan*) is conducted into the pit after being received upon a bed of broken stone, which removes all grit and coarse matter. Observations conducted in the town of Antipolo, where systems resembling this type have been in use for a number of years, have shown that they give satisfaction with a minimum of care when constructed along the lines indicated. The cost of materials and installation, not including labor, will not exceed 10 pesos.

A method of garbage disposal has been recommended which consists in the provision of proper receptacles at each house, frequent collection, and disposal by using for filling purposes, the garbage at place of dumping to be covered with clean earth immediately after being dumped.

Recommendations were made as to the improving of housing conditions by the development of what is known as a "model sanitary house," which is constructed throughout of bamboo in such manner as to provide plenty of light and ventilation, a sufficient number of rooms to provide for separation of sexes and to avoid overcrowding, to contain a separate kitchen and dining room, an Antipolo type of sewage disposal, and room for the installation of a cheap shower bath.

A thorough and complete investigation was made of living conditions for the purpose of determining the average income and the method in which it is expended. It is not believed, however, that sufficient data have as yet been obtained as regards income to make a positive statement. The following, however, was developed:

The food or ration now used by the average Filipino family is poorly balanced and lacking in nutritive properties, and is poorly prepared and served. It is poorly balanced in that the preponderant element is rice, polished, and as a rule of inferior quality. The protein element, particularly as regards animal protein, is lacking. There is also an insufficiency of fat, and vegetables and fruits are not used in anywhere near the proportions in which they should be used. The food as a rule is poorly prepared, insufficiently cooked, and improperly served; it is eaten in a great majority of instances with the fingers by dipping into a common dish, and meals are at irregular intervals. After a sufficient number of towns have been investigated and the problem of obtaining, preparing, and serving a properly balanced diet has been sufficiently studied, definite recommendations

for general use will be worked out, which will include sample menus, cost data, instructions as to preparation and balancing of constituents, and as to serving and use.

Drainage and Canalization to Prevent Fly and Mosquito Breeding.

Occasional attempts at drainage and canalization were noted on the part of individuals only. The streets were narrow, muddy, and without side canals for drainage, were poorly graded and very crooked. Low lands existed in various places and were found to be harboring and breeding mosquitoes. Vacant lots were found to contain garbage and rubbish of various sorts and served as fly-breeding foci. In order to correct these conditions a careful study of the topography of the town was made by the engineer and a map prepared which shows how, with a minimum of expenditure and effort, the streets may eventually be widened and straightened and the houses and lots relocated in such manner as to create a town with straight, wide, and well-laid streets, and building lots of sufficient size.

Improvements in Health Organization.

This will be automatically cared for by the operation of act 2468, which provides for the inclusion of the municipalities of the islands into sanitary divisions under the control of the provincial health officer, presidents of sanitary divisions, and other local health officials. In Pasig a visiting nurse has already been provided as a result of the energy of the woman's club which was formed after observing the work done and the results obtained by the nurses attached to the sanitary commission. A free clinic for the treatment of infants' diseases and for demonstrations of methods of preparing infant food and for actual infant feeding in case of illness is open daily in the "sanitary house."

Markets, Dairies, Etc.

The town is already in possession of a modern concrete market, which, however, is not being maintained in as good condition as might be. This will be corrected by inspection through the health organization. It was found that toilet facilities were inadequate for the great numbers who daily go to market, and funds have since been appropriated for the construction of the additional facilities needed and of an additional wing to the market. The establishment of dairies has not so far been brought about. The dairy problem in Pasig is the same as anywhere else in the islands and requires such an outlay of capital and so great an expense for supervision, inspection, bottling, and refrigeration as to make the price of milk prohibitive to all except a few. The municipal slaughterhouse is a building of strong materials immediately adjoining the

market, with a concrete floor and well-laid drains. The municipal cemetery was found to be maintained in good condition. The few factories which exist in Pasig are small in size and primitive in methods. Unsatisfactory hygienic conditions were found, but upon recommendation they were improved.

Investigation of the municipal revenues showed that as now collected and managed they are sufficient for present needs only. It is believed, however, that with more care in collection the total could be somewhat increased. The principal need is for economic development. Possibilities are believed to exist in three directions, namely, agriculture, pottery, and shoe manufacture.

The principal product of agriculture in Pasig is rice. But one crop a year is obtained and the yield can not be considered as high. It is believed that the establishment of small and inexpensive irrigation systems through the use of artesian or surface wells and through the use of surface waters pumped by either gasoline or oil engines or by windmills would be productive of an increase in crops. Also, a greater variety of crops would be of advantage both financially and as a means of supplying a better balanced diet.

The pottery industry is conducted by a number of individuals who are constantly in competition with each other. It is believed that should the plan be adopted of standardizing, through cooperation, the product manufactured and marketing through a central agency, a better product and higher returns could be obtained.

The third industry is that of manufacturing shoes for native consumers. The same remarks apply to this as to the pottery industry.

Upon the conclusion of the investigations, ordinances were prepared which will be furnished to the municipality for enactment. Through their intelligent enforcement under the stimulus and direction of the district health officer, the president of the sanitary division, and the other local health officials, with the cooperation, assistance, and encouragement of the central office of the Philippine health service, it is believed that sanitary conditions in Pasig can gradually, during the next few years, be much improved, to the ultimate benefit not only of the community of Pasig but of other communities which will undoubtedly follow its example.

Follow-up work will be continued through visits, talks, moving-picture shows, demonstrations, etc., so that the interest that has been aroused will not be allowed to lag. Then, in the course of a year or so, another study of the town will be made along the same lines as the first investigation in order to determine how much ground has been gained, and for the purpose of correcting faults that may now exist undiscovered or that may unconsciously or otherwise develop in the future.

Since the first commission took the field in June, 1915, another commission has been formed.

The two commissions have been continuously at work during the year and have completed their investigations and made recommendations for the following towns: Pasig, Rizal; Antipolo, Rizal; Paranaque, Rizal; Las Pinas, Rizal. The original commission will complete its work by August, 1916, in Navotas, Rizal; the second commission is now completing its labors at Boac, Marinduque; and a third commission is being formed.

THE NEW EDITIONS OF THE U. S. P. AND THE N. F.

A REVIEW OF THE PHARMACOPŒIA OF THE UNITED STATES OF AMERICA, NINTH DECENNIAL REVISION, AND OF THE NATIONAL FORMULARY, FOURTH EDITION.

By M. I. WILBERT, Technical Assistant, Division of Pharmacology, Hygienic Laboratory, United States Public Health Service.

The Pharmacopœia of the United States of America, ninth decennial revision, and the National Formulary, fourth edition, which are decreed to be official from September 1, 1916, are now available in the ordinary channels of trade. Public health officials and others intrusted with the enforcement of pure drug laws will no doubt be interested in the nature and composition of these two books that are recognized by law as standards for drugs and preparations and which are generally used as the basis for prosecution in cases involving adulteration or the misbranding of drugs. The two books were this time published simultaneously, and for the first time in their history an effort has been made to have them in harmony as to contents and standards.

The Pharmacopœia of the United States, ninth decennial revision, contains a total of 80 and 728 large octavo pages and in general appearance and style the book has much in common with the previous edition of the Pharmacopœia, now out of date, though in fact every monograph has been rewritten and practically every line in the book revised. The preparatory pages of the Pharmacopœia include a table of contents, a short historical introduction with a review of the proceedings of the ninth decennial convention in 1910 and a preface in which the changes in the Pharmacopœia are briefly outlined. The introductory pages also include a number of tables, among others a review of the International Protocol compared with the drugs and preparations of the U. S. P. IX. and lists of the admissions, deletions, and changes in the official Latin titles and in the official English titles of the Pharmacopœia followed by a comparative table showing the strength of the more important pharmaceutical preparations in the preceding and in the present Pharmacopœia.